Chp65-1. Evaluate the profit comparison of four e-commerce website designs A/B/C/D. Is there a difference? (Using SPSS software analysis)

(1). [Question]: What are the x and y variables in this analysis question?

	A	B	C
1	ID	設計樣式	消費金額
2	1	設計1	481
3	2	設計1	1476
4	3	設計1	854
5	4	設計1	617
6	5	設計1	1199
7	6	設計1	1324
8	7	設計1	1372
9	8	設計1	1448
10	9	設計1	1072
11	10	設計1	1689
12	11	設計1	700
13	12	設計1	897
14	13	設計1	800
15	14	設計1	1149
16	15	設計1	1360
17	16	設計1	1700
18	17	設計1	739
19	18	設計1	1189
20	19	設計1	1690
21	20	設計1	1316
22	21	設計1	1094

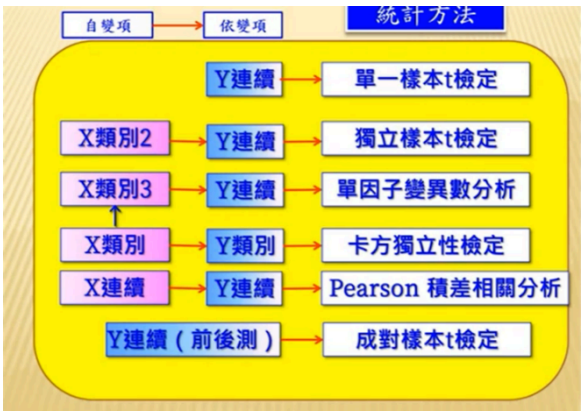
	A	B	C
1274	1273	設計4	1540
1275	1274	設計4	1410
1276	1275	設計4	1043
1277	1276	設計4	1602
1278	1277	設計4	1338
1279	1278	設計4	812
1280	1279	設計4	842
1281	1280	設計4	1172
1282	1281	設計4	1676
1283	1282	設計4	1042
1284	1283	設計4	851
1285	1284	設計4	1538
1286	1285	設計4	991
1287	1286	設計4	2122
1288	1287	設計4	1476
1289	1288	設計4	706
1290	1289	設計4	1245
1291	1290	設計4	1730
1292	1291	設計4	1316
1293	1292	設計4	1373
1294	1293	設計4	1015
1295	1294	設計4	924

(1). [Question]: What [statistical test] should be used for this type of data?

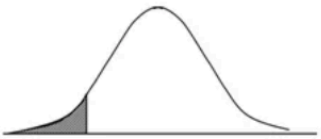
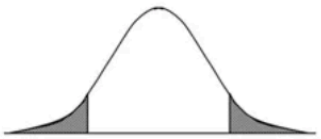
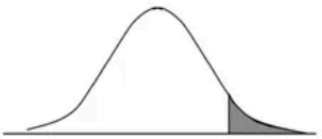
Method: One-way ANOVA

Because x is a four-category variable and y is a continuous numerical value

(Note: There is only one x factor, so it is called [one-way])



(2). [Question]: Is this a [two-tailed test, a right-tailed test, or a left-tailed test]?

單尾檢定（左尾）	雙尾檢定	單尾檢定（右尾）
$H_0 : \mu = \mu_0$ $H_1 : \mu < \mu_0$	$H_0 : \mu = \mu_0$ $H_1 : \mu \neq \mu_0$	$H_0 : \mu = \mu_0$ $H_1 : \mu > \mu_0$
		

[Is there a difference in the average purchase amount between designs ABCD?], which belongs to a two-tailed test

(3). [How to set up statistical hypotheses]: What are the 2 hypotheses for [Is there a difference in the profit comparison of the four website designs A/B/C/D]?

➜ Question's proposition: Is there a difference in the profit comparison of the four website designs A/B/C/D?
➜ Converted to: Statistical hypothesis:

- **1. H0 Null hypothesis (hypothesis of negation)**
  - **μOriginal design A = μDesign B = μDesign C = μDesign D**
- **2. H1 Alternative hypothesis (hypothesis of affirmation) ➜**
  - **At least two design styles have different average sales amounts**

➜ [Note]: H0 Null hypothesis/Negative hypothesis: is the opposite of the proposition
➜ [Note]: H1 Alternative hypothesis/Positive hypothesis: is the affirmation of the proposition

(4). [Question]: [Is there a difference in the profit comparison of the four website designs A/B/C/D]?

敘述統計

消費金額

	N	平均值	標準差	標準誤	平均值的 95% 信賴區間		最小值	最大值
					下限	上限		
設計樣式1	323	1236.93	345.433	19.220	1199.12	1274.75	171	2253
設計樣式2	325	1240.51	349.757	19.401	1202.34	1278.68	326	2388
設計樣式3	330	1330.21	347.091	19.107	1292.62	1367.79	305	2357
設計樣式4	325	1256.54	342.418	18.994	1219.17	1293.91	219	2139
總計	1303	1266.34	347.865	9.637	1247.43	1285.24	171	2388

變異數分析

消費金額

	平方和	自由度	均方	F	顯著性
群組之間	1873468.605	3	624489.535	5.211	.001
群組內	155681522.5	1299	119847.207		
總計	157554991.1	1302			

Step 1: Look at the significance p-value:

Significance p-value 0.01 < 0.05 confidence level 0.05,

➜ So it meets the H1 alternative hypothesis
➜ H1 Alternative hypothesis: There is a difference in the profit comparison of the four website designs A/B/C/D
➜ H1 Alternative hypothesis: At least two design styles have different average sales amounts

(5). [Conclusion]:

1. [Conclusion 1]: These 4 website design methods have a significant difference in the impact on sales amount (at least there is a significant difference between two groups) 2. [Conclusion 2]: Currently, it is only known that there is a significant difference in the sales effect of at least 2 designs among these 4 website design methods, but it is not known who is with whom? (I don't know the influence relationship between the 4)
3. [Conclusion 3]: Make a [Recommendation table of A/B/C/D plans]

網站設計種類	平均銷售金額	建議採用順序
設計3	1330	1
設計4	1256	2
設計2	1240	3
設計1(原本設計)	1236	4

(6). [Drawing]: Box plot

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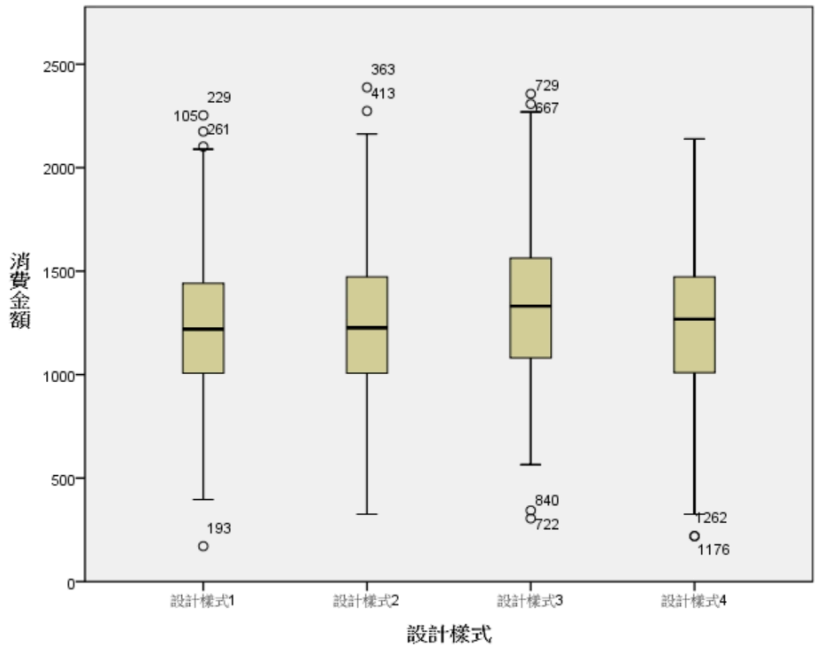

(7). [Drawing]: Line chart

平均值圖形